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(54) ELECTRON EMISSION ELEMENT, ELECTRON SOURCE, IMAGE FORMING DEVICE AND THEIR MANUFACTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a structure of an electron emission element allowing its area to be increased at a low cost, an electron source and an image forming device and to provide manufacturing methods for them.

SOLUTION: This manufacturing method of an electronic emission element comprises a process for forming resin composition layers 32, 37 for increasing a hydrophilic property of a light irradiated part and for increasing a water- absorptive property of a metal composition solution on the surface of a substrate 1 by light irradiation or by light irradiation and heating, a process for performing light irradiation or light irradiation and heating to a part of the resin composition layer 32, a process for applying the metal composition solution to the light-irradiated part of the resin composition layer 32, a process for forming element electrodes 2, 3 and a conductive film 4 by thermally decomposing the resin composition layer 32 and the metal composition 37, and a forming process for forming an electron emission part 5 on the conductive film 4.

LEGAL STATUS

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the mimetic diagram showing an example of the electron emission component concerning this invention.
[Drawing 2] It is drawing for explaining the manufacture approach of the electron emission component of this invention.
[Drawing 3] It is drawing for explaining the manufacture approach of the electron emission component of this invention.
[Drawing 4] It is the mimetic diagram showing an example of the voltage waveform in energization processing employable on the occasion of manufacture of the electron emission component of this invention.
[Drawing 5] It is the outline block diagram showing an example of the vacuum processor (measurement assessment equipment) which can be used for manufacture of the electron emission component of this invention.
[Drawing 6] It is drawing showing the electron emission characteristic of the electron emission component of this invention.
[Drawing 7] It is the mimetic diagram showing an example of the electron source of passive-matrix arrangement of this invention.
[Drawing 8] It is the mimetic diagram showing an example of the display panel of the image formation equipment of this invention.
[Drawing 9] It is the mimetic diagram showing an example of the fluorescent screen in a display panel.
[Drawing 10] It is the block diagram showing an example of the actuation circuit for displaying on the image formation equipment of this invention according to the TV signal of NTSC system.
[Drawing 11] It is the mimetic diagram showing an example of the electron source of ladder mold arrangement of this invention.
[Drawing 12] It is the mimetic diagram showing an example of the display panel of the image formation equipment of this invention.
[Drawing 13] It is the mimetic diagram showing the electron emission component arranged on the base in an example 1.
[Drawing 14] It is the mimetic diagram showing the voltage waveform in foaming processing of an example 1.
[Drawing 15] It is the mimetic diagram showing the voltage waveform in the activation of an example 1.

[Drawing 16] It is the mimetic diagram showing a part of electron source of an example 2.
[Drawing 17] It is the block diagram of the image display device of an example 3.
[Drawing 18] It is the mimetic diagram of the surface conduction mold electron emission component of the conventional example.
[Description of Notations]
1 Substrate

2 Three Component electrode
4 Conductive Film
5 Electron Emission Section
31 Ink Jet Nozzle
32 Resin Constituent Layer
33 Photo Mask
34 Exposure Part
35 Metal Constituent for Electrodes
36 Exposure Part
37 Metal Constituent for Conductive Film
50 Ammeter for Measuring Component Current If
51 Power Source for Impressing Component Electrical Potential Difference Vf to Electron Emission Component
52 Ammeter for Measuring Emission Current Ie Emitted from Electron Emission Section 5
53 High Voltage Power Supply for Impressing Electrical Potential Difference to Anode Electrode 54
54 Anode Electrode for Catching Electron Emitted from Electron Emission Section 5
55 Vacuum Housing
56 Exhaust Air Pump
71 Electron Source Substrate
72 The Direction Wiring of X
73 The Direction Wiring of Y
74 Electron Emission Component
75 Connection
81 Rear Plate
82 Housing
83 Glass Substrate
84 Fluorescent Screen
85 Metal Back
86 Face Plate
87 Secondary Terminal
88 Envelope
91 Black Electric Conduction Material
92 Fluorescent Substance
101 Display Panel
102 Scanning Circuit
103 Control Circuit
104 Shift Register
105 Line Memory
106 Synchronizing Signal Separation Circuit
107 Modulating-Signal Generator
Vx, Va Direct current voltage supply
110 Electron Source Substrate
111 Electron Emission Component
112 Common Wiring for Wiring Electron Emission Component
120 Grid Electrode
121 Opening for Electron to Pass
191 Base
192,193 Component electrode
194 Conductive Film
197 Layer Insulation Layer
198 Line Writing Direction Wiring corresponding to Dxm

199 Line Writing Direction Wiring corresponding to Dyn
201 Display Panel
1001 Actuation Circuit of Display Panel
1002 Display Controller
1003 Multiplexer
1004 Decoder
1005 Input/output Interface Circuit
1006 CPU
1007 Image Generation Circuit
1008, 1009, 1010 Image memory interface circuitry
1011 Image Input Interface Circuitry
1012 1013 TV signal receive circuit
1014 Input Section

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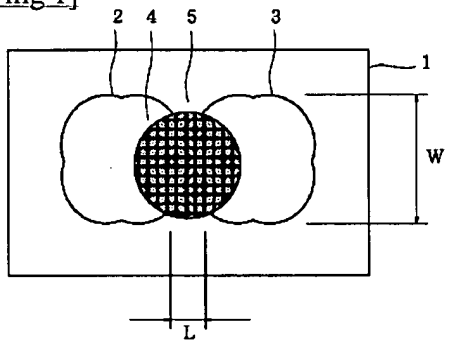
DRAWINGS

[Drawing 1]

(a)



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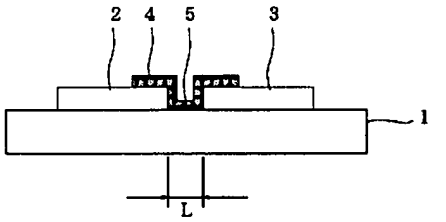
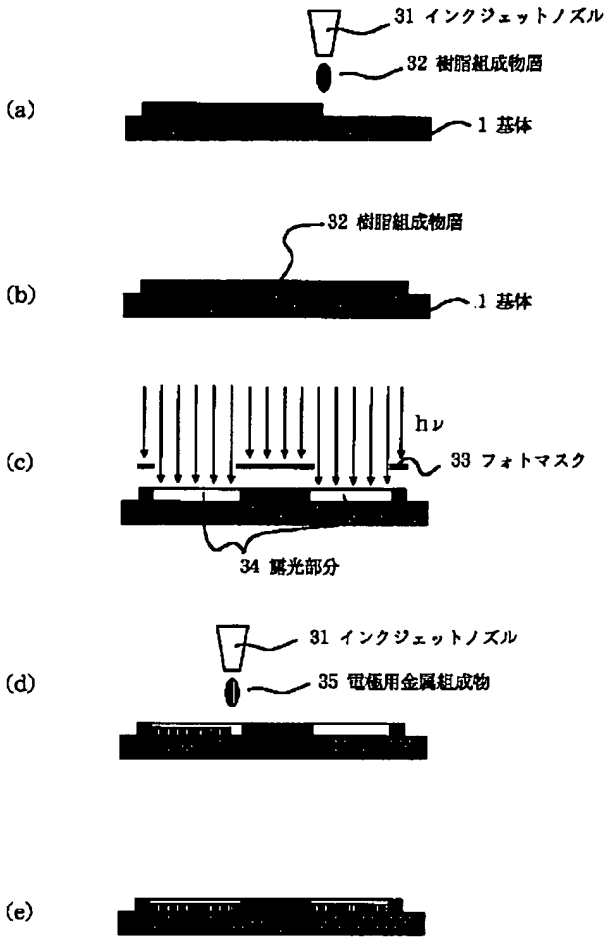
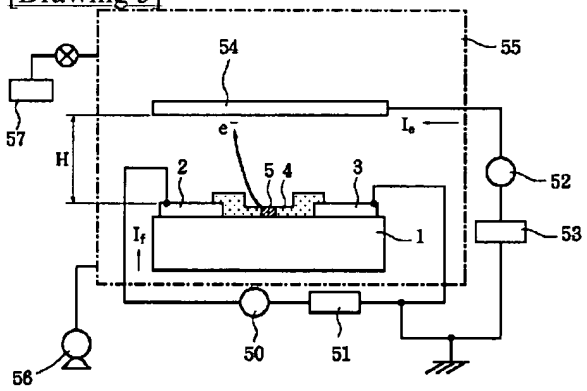


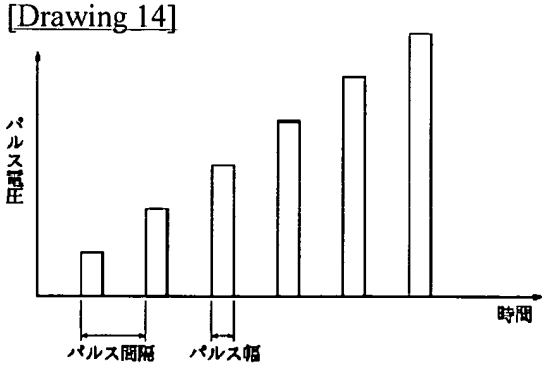
[Drawing 2]



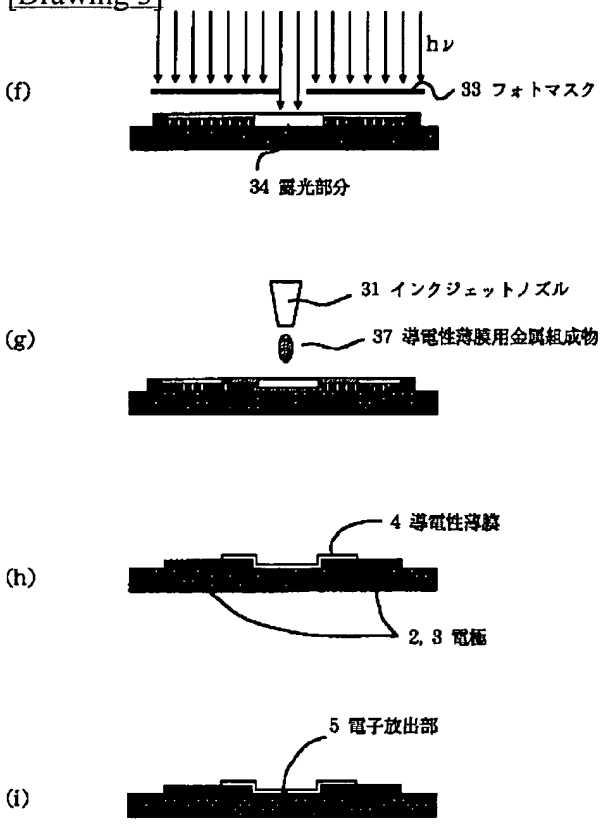
[Drawing 5]



[Drawing 14]



[Drawing 3]



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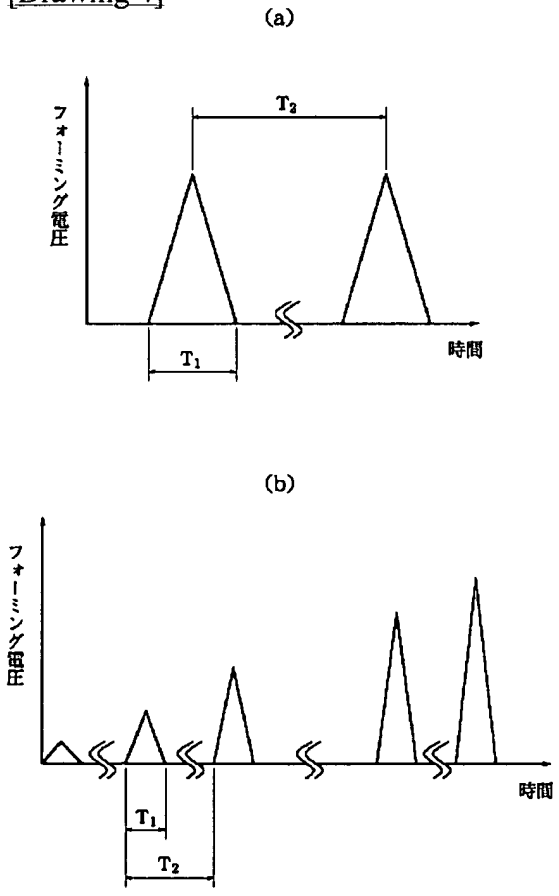

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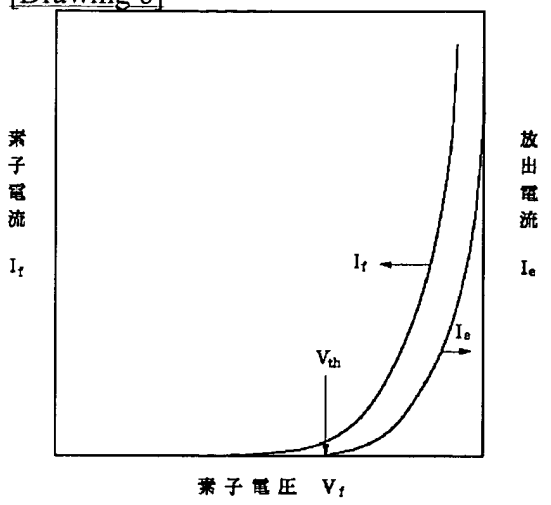
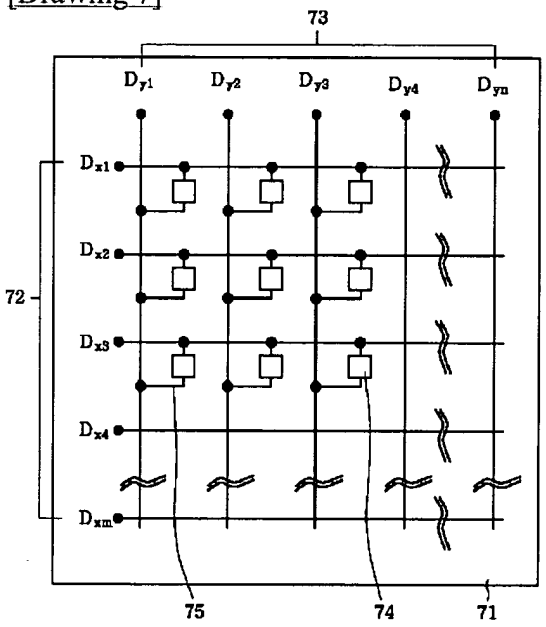
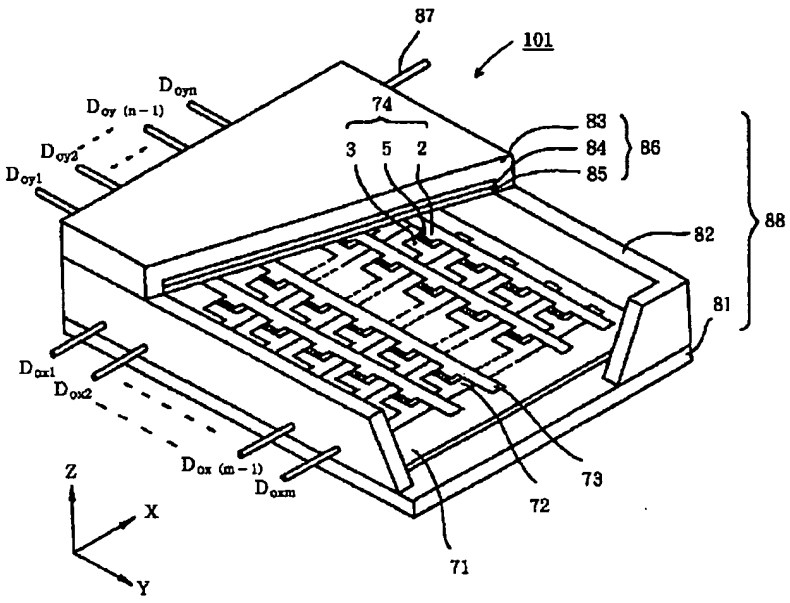


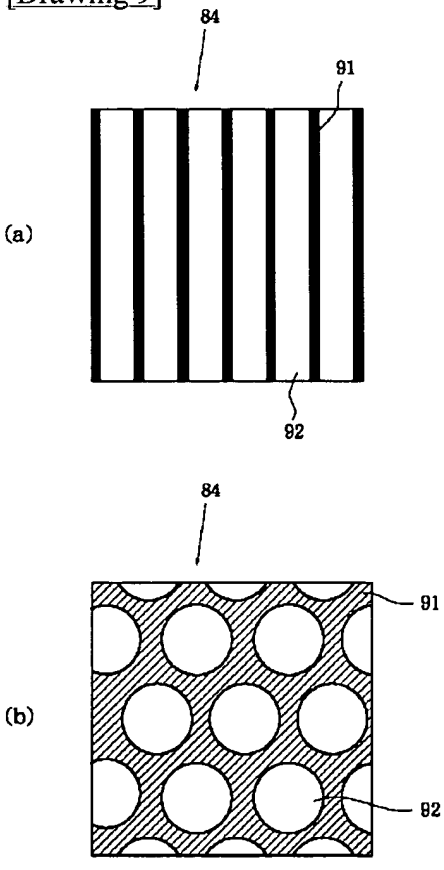
[Drawing 7]



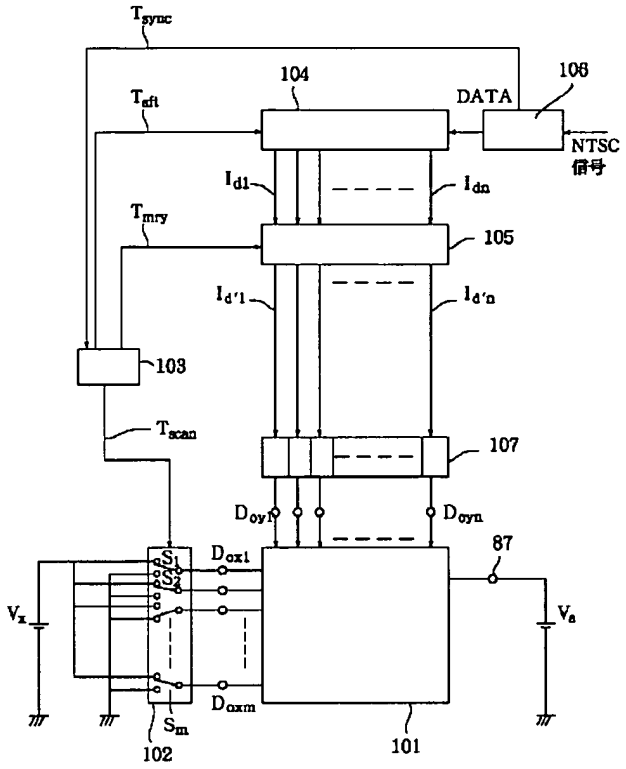
[Drawing 8]



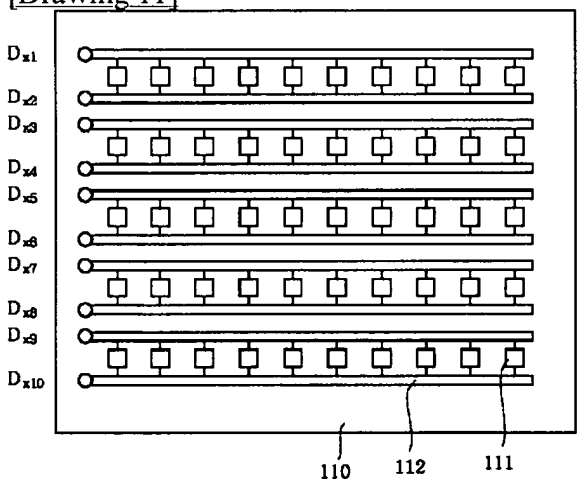
[Drawing 9]



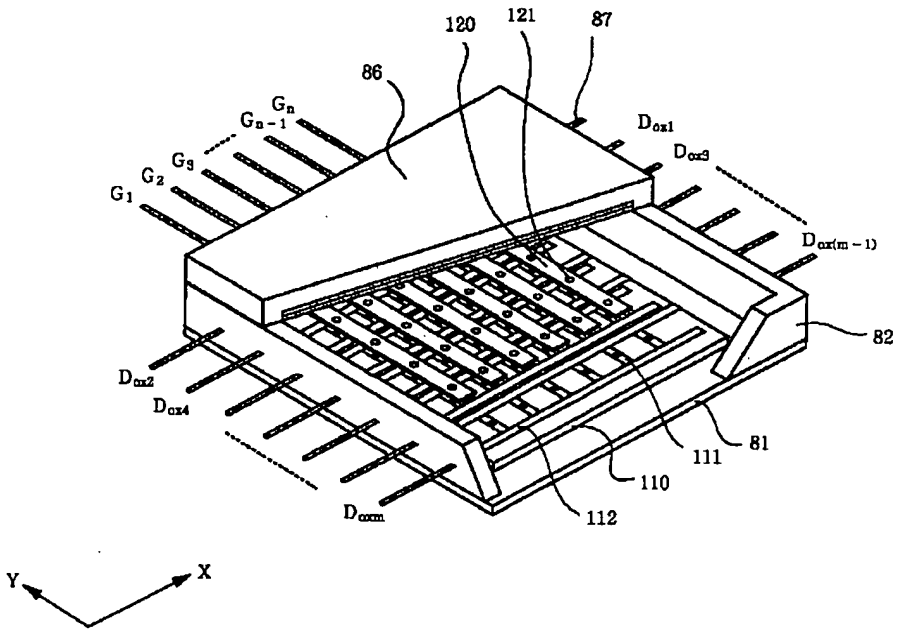
[Drawing 10]



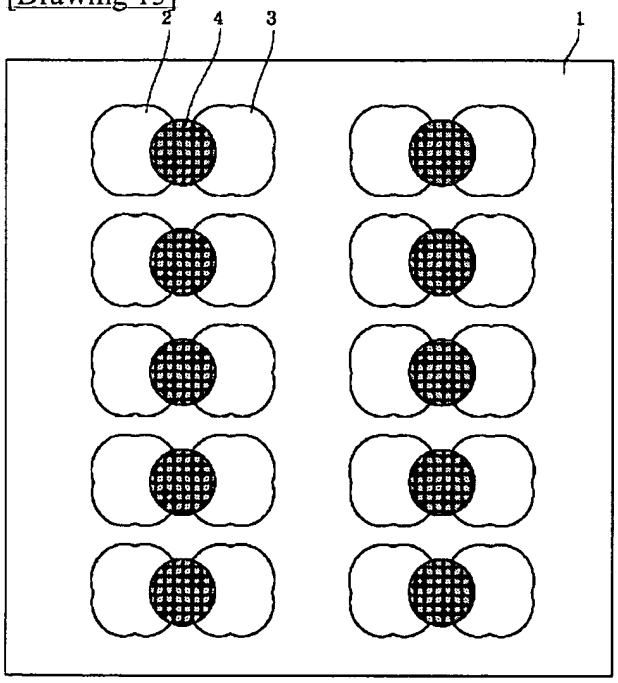
[Drawing 11]



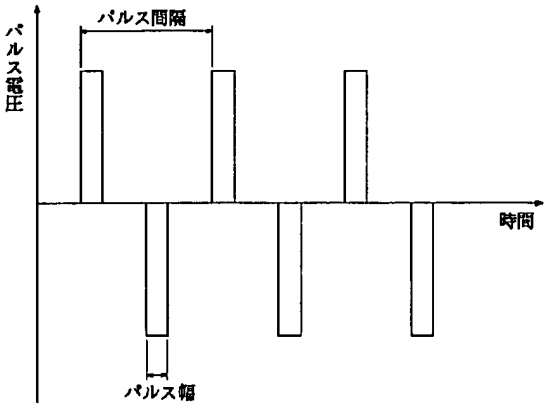
[Drawing 12]



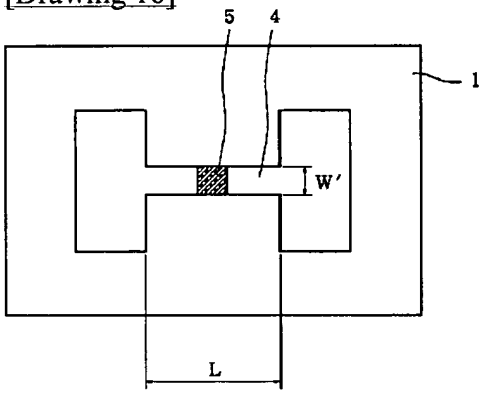
[Drawing 13]



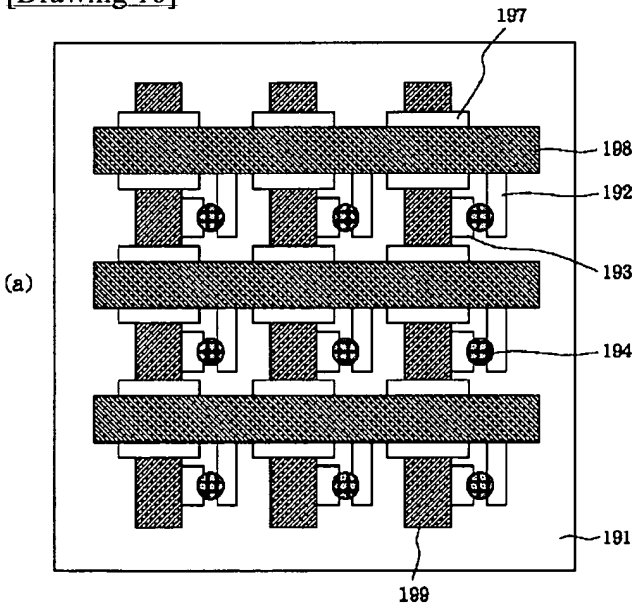
[Drawing 15]

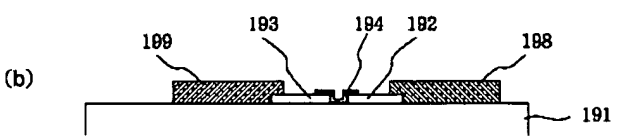


[Drawing 18]

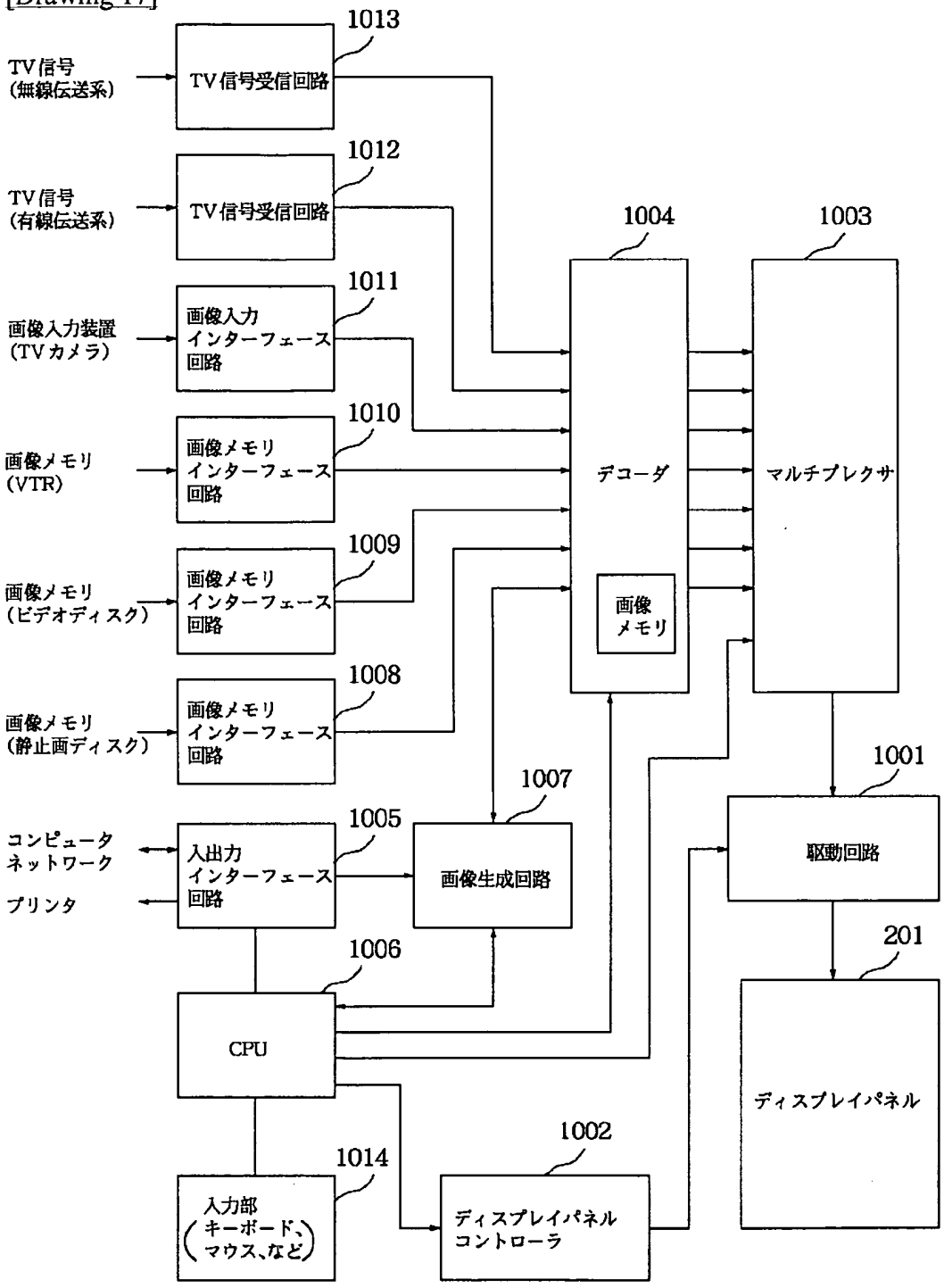


[Drawing 16]





[Drawing 17]



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to image formation equipments, such as a display constituted using the electron source and this electron source which come to arrange a majority of electron emission components and these electron emission components, and an aligner, and those manufacture approaches.
[0002]
[Description of the Prior Art] Conventionally, it divides roughly into an electron emission component, and two kinds, a thermionic emission component and a cold cathode electron emission component, are known. There are a field emission mold ("FE mold" is called hereafter.), a metal / insulating layer / metal mold (an "MIM mold" is called hereafter.), a surface conduction mold electron emission component, etc. as cold cathode electron emission component.
[0003] As an example of FE mold W. P. Dyke and W.W. Dolan and "Field Emission", Advance in Electron Physics 8, 89 (1956), or C.A. Spindt "Physical Properties of thin-filmfield emission cathodes with molybdenum cones" J. Appl. Phys. What was indicated by 47, 5248 (1976), etc. is known.
[0004] As an example of an MIM mold, it is C.A. Mead "Operation ofTunnel-Emission Devices" J. Appl.Phys. What was indicated by 32,646 (1961) etc. is known.
[0005] As an example of a surface conduction mold electron emission component, it is M.I. Elinson Radio Eng. Electron Phys. There are some which were indicated by 10, 1290 (1965), etc.
[0006] A surface conduction mold electron emission component uses the phenomenon which electron emission produces by passing a current at parallel at a film surface in the thin film of the small area formed on the insulating substrate. As this surface conduction mold electron emission component, it is SnO2 by said Elinson etc. The thing using a thin film, Thing [G. by Au thin film Dittmer: "Thin Solid Films", 9,317(1972)], In 2O3 / SnO2 Thing [M. by the thin film Hartwell and C.G. Fonstad: "IEEE Trans. ED Conf.", 519(1975)], Others [/ by the carbon thin film / thing [Araki **]: A vacuum, the 26th volume, No. 1, 22-page (1983)], etc. are reported.
[0007] As a typical example of these surface conduction mold electron emission components, above-mentioned M. Hartwell's component configuration is typically shown in drawing 18 R> 8. In this drawing, 1 is a substrate. 4 is the conductive film, it consists of a metallic-oxide thin film formed in the pattern of H mold configuration, and the electron emission section 5 is formed of the energization processing called the below-mentioned energization foaming. In addition, 0.5-1mm and W' are set up for the component electrode spacing L in drawing by 0.1mm.
[0008] In these surface conduction mold electron emission components, before performing electron emission, it is common to form the electron emission section 5 by energization processing beforehand called energization foaming in the conductive film 4. that is, with energization foaming, impression energization of the electrical potential difference is carried out to the ends of said conductive film 4, the conductive film 4 is broken, deformed or deteriorated locally, and structure is changed -- making -- electric -- high -- it is the processing which forms the electron emission section 5 of a condition [****].

In addition, in the electron emission section 5, the crack has occurred on some conductive film 4, and electron emission is performed from near [the] a crack.
[0009] Since structure is simple, an above-mentioned surface conduction mold electron emission component has the advantage which covers a large area and can carry out array formation of the a large number component. Then, the various application for harnessing this description is studied. For example, utilization to image formation equipments, such as a source of an electrification beam and a display, is mentioned.
[0010] Conventionally, as an example which carried out array formation of many surface conduction mold electron emission components, a surface conduction mold electron emission component is arranged to juxtaposition, and the electron source which carried out the line array (it is also called ladder mold arrangement) of many lines which connected the ends (both components electrode) of each surface conduction mold electron emission component with wiring (it is also called common wiring), respectively is mentioned (for example, JP,64-31332,A, JP,1-283749,A, a 2-257552 official report).
[0011] Moreover, especially in the display, the display which combined the electron source to which it was possible to have considered as the display using liquid crystal and the same plate mold display, and the back light has moreover arranged many surface conduction mold electron emission components as an unnecessary spontaneous light type display, and the fluorescent substance which emits light in the light by the exposure of the electron ray from this electron source is proposed (the U.S. patent No. 5066883 description).
[0012]
[Problem(s) to be Solved by the Invention] However, when the image formation equipment using such an electron emission component was large-area-ized and it was going to manufacture using the conventional photolithography technique, it was necessary to enlarge manufacturing installations, such as a vacuum evaporator, and there was a problem that immense costs started.
[0013] The object of this invention is to offer the electron source which used it for the new configuration of the electron emission component in which large-area-izing is possible, and the list by low cost, image formation equipments, and those manufacture approaches in view of the above-mentioned problem.
[0014]
[Means for Solving the Problem] The configuration of this invention accomplished that the above-mentioned object should be attained is as follows.
[0015] Namely, the first of this invention, on a substrate front face, with an optical exposure or an optical exposure, and heating, while making the hydrophilic property of an optical exposure part increase The process which forms the resin constituent layer to which the absorptivity of a metal constituent solution is made to increase, The process which performs optical exposure or optical exposure, and heating in a part of resin constituent layer, and the process which gives a metal constituent solution to the optical exposure section of a resin constituent layer, A resin constituent layer and a metal constituent are pyrolyzed, and it is in the manufacture approach of the electron emission component characterized by having the process which forms a component electrode and the conductive film, and the foaming process which forms the electron emission section in the conductive film.
[0016] Moreover, the second of this invention is in the electron emission component characterized by being manufactured by the primary method of above-mentioned this invention.
[0017] Moreover, the third is an electron source which emits an electron according to the input signal of this invention, and is in the electron source characterized by having arranged two or more second electron emission component of above-mentioned this invention on a base.
[0018] Moreover, the fourth of this invention is the approach of manufacturing the third electron source of above-mentioned this invention, and is in the manufacture approach of the electron source characterized by manufacturing two or more electron emission components by the primary method of above-mentioned this invention.
[0019] Moreover, the fifth is equipment which forms an image based on the input signal of this invention, and is in the image formation equipment characterized by having the image formation member which forms an image at least by the exposure of the electron ray emitted from the third

electron source and this electron source of above-mentioned this invention.
[0020] Furthermore, the sixth of this invention is the approach of manufacturing the fifth image formation equipment of above-mentioned this invention, and is in the manufacture approach of the image formation equipment characterized by manufacturing an electron source by the fourth approach of above-mentioned this invention.
[0021] While making the hydrophilic property of an optical exposure part increase with an optical exposure or an optical exposure, and heating on a substrate front face as a result of this invention person's inquiring wholeheartedly The process which forms the resin constituent layer to which the absorptivity of a metal constituent solution is made to increase, The process which performs optical exposure or optical exposure, and heating in a part of resin constituent layer, and the process which gives a metal constituent solution to the optical exposure section of a resin constituent layer, In the process which pyrolyzes a resin constituent layer and a metal constituent, has the process which forms a component electrode and the conductive film, and the foaming process which forms the electron emission section in the conductive film, and gives a metal constituent solution to the above-mentioned optical exposure section The electron source of the large area which was excellent in the electron emission component in which large-area-izing is possible, and the electron emission component and productivity with low cost, and image formation equipment are offered by giving a metal constituent solution to the optical exposure section using an ink jet method like Bubble Jet or a piezo jet method.
[0022] Even when the metallic materials of the conductive film and component electrode which do not need to enlarge manufacturing installations, such as a vacuum evaporator, and form the electron emission section differ according to the above-mentioned manufacture approach, on a substrate front face first, for example with an optical exposure or an optical exposure, and heating While the hydrophilic property of an optical exposure part increases, the resin constituent layer which the absorptivity of a metal constituent solution increases is prepared. Next, give the metal constituent solution which carries out the optical exposure of the part which should give a component electrode material, and contains a component electrode material, and a solvent is dried. Next, the component electrode and the conductive film by which patterning was therefore carried out to the target configuration giving the metal constituent solution which carries out the optical exposure of the part which should give a conductive film ingredient, and contains a conductive film ingredient, drying a solvent, and pyrolyzing at the end are obtained. Reverse is sufficient as the sequence of grant of a component electrode material and a conductive film ingredient.
[0023] Rather than the manufacture approach by the conventional photolithography technique, a manufacturing cost not only including the cost of the manufacturing installation itself but a routing counter can be reduced.
[0024] namely, by the manufacture approach by the conventional photolithography technique For example, on a substrate, vapor-deposit a component electrode material, and apply a photopolymer, next make it expose with a photo mask, and patterning of a photopolymer is performed. After etching removes the component electrode material of an unnecessary part, remove a photopolymer, further, vapor-deposit a conductive film ingredient, and apply a photopolymer, next make it expose with a photo mask, and patterning of a photopolymer is performed. A photopolymer is removed after etching removes the conductive thin film material of an unnecessary part. Although reverse is sufficient as the sequence of patterning of a component electrode material and a conductive film ingredient, in order to manufacture an electron emission component, many processes are needed from the manufacture approach of this invention.
[0025] Moreover, since optical exposure and grant of a metal constituent solution can also be simultaneously performed in this invention by using not the approach according an optical exposure to a photo mask but approaches, such as laser scanning, it is also possible to lessen a routing counter further.
[0026] Therefore, without using the conventional photolithography technique in which enlargement of a manufacturing installation is needed with large-area-izing of image formation equipment etc. according to this invention, it becomes possible to form the detailed conductive film and a component electrode pattern by low cost over a large area, and the electron source and image formation equipment of the

large area excellent in productivity can be obtained.
[0027]
[Embodiment of the Invention] Next, the desirable embodiment of this invention is shown.
[0028] Drawing 1 is the mimetic diagram showing the example of 1 configuration of the electron emission component of this invention, drawing 1 (a) is a top view and drawing 1 (b) is drawing of longitudinal section. For 1, as for an electrode (component electrode) and 4, in drawing 1 , a substrate, and 2 and 3 are [the conductive film and 5] the electron emission sections.
[0029] As a substrate 1, it is SiO2 by a spatter etc. to the glass which decreased impurity contents, such as quartz glass and Na, blue plate glass, and blue plate glass. Ceramics, Si substrates, etc. which carried out the laminating, such as a layered product and an alumina, can be used.
[0030] A common conductor material can be used as an ingredient of the component electrodes 2 and 3 which counter. For example, metals, such as nickel, Cr, Au, Mo, W, Pt, Ti, aluminum, Cu, and Pd, or an alloy, and Pd, the printed conductor which consists of a metal or a metallic oxide, glass, etc., such as Ag, Au, RuO2, and Pd-Ag, and In2 O3-SnO2 etc. -- it is suitably chosen from semi-conductor conductor material, such as a transparence conductor and polish recon, etc.
[0031] The configuration of the component electrode spacing L, component electrode die-length W, and the conductive film 4 etc. is designed in consideration of the gestalt applied. The component electrode spacing L can be made into the range of hundreds of micrometers from hundreds of nm, and can be more preferably made into the range of several micrometers to dozens of micrometers in consideration of the electrical potential difference impressed to component inter-electrode. Component electrode die-length W can be made into the range of several micrometers to hundreds of micrometers in consideration of the resistance of an electrode, and the electron emission characteristic. Thickness d of the component electrodes 2 and 3 can be made into the range of several micrometers from dozens of nm.

[0032] In addition, apart from the configuration shown in drawing 1 , it can also consider as the configuration formed in order of the conductive film 4 and the component electrodes 2 and 3 on the substrate 1. Moreover, all between the component electrode 2 which counters depending on a process, and 3 may function as the electron emission section.
[0033] As an ingredient which constitutes the conductive film 4, it is suitably chosen, for example from metals, such as Pd, Pt, Ru, Ag, Au, Ti, In, Cu, Cr, Fe, Zn, Sn, Ta, W, and Pb. These metals form the organometallic compound of a conductive film ingredient.
[0034] Although the thickness of the conductive film 4 is suitably set up in consideration of the resistance between the step coverage to the component electrodes 2 and 3, the component electrode 2, and 3 etc., it is good to consider as the range of 1nm - 50nm usually preferably [considering as the range of several angstroms - hundreds of nm], and more preferably. For the resistance, Rs is 102. omega/** to 107 It is desirable that it is the value of omega/**. In addition, Rs is a value in which it appears in w when width of face places the resistance R which die length measured in the die-length direction of the thin film of l with R=Rs (l/w).
[0035] In this description, although energization processing is mentioned as an example and explained about foaming processing, foaming processing is not restricted to this and includes the processing which the film is made to produce a crack and forms a high resistance condition.
[0036] The electron emission section 5 is constituted by the crack of the high resistance formed in some conductive film 4, and the conductive particle of the particle size of the range of dozens of nm may exist in the interior from several angstroms. This conductive particle contains some elements of the ingredient which constitutes the conductive film 4, or all elements. Moreover, on the electron emission section 5 and the conductive film 4 of the near, it can also have the carbon or the carbon compound formed of the below-mentioned activation process.
[0037] Although there are various approaches as the manufacture approach of the electron emission component of this invention, the example is explained based on drawing 2 and drawing 3 . In addition, the same sign as the sign given to drawing 1 is given to the same part as the part shown in drawing 1 also in drawing 2 and drawing 3 .

[0038] 1) Fully wash a substrate 1 using a detergent, pure water, an organic solvent, etc., and with an optical exposure or an optical exposure, and heating, while the hydrophilic property of an optical exposure part increases, form the resin constituent layer 32 which the absorptivity of the metal constituent solution mentioned later increases (drawing 2 (b)). Although it is desirable to use an ink jet method like Bubble Jet like drawing 2 (a) or a piezo jet method as for formation of the resin constituent layer 32, it may use the applying method by the spinner method etc.
[0039] 2) Perform pattern exposure in the resin constituent layer 32 of the part in which the component electrodes 2 and 3 should be formed (drawing 2 (c)). It follows on progress of a reaction, hydrophilic groups, such as a hydroxyl group, generate and increase, and the exposure part 34 becomes easy to absorb the organic metal constituent 35 for electrodes. It can act as the monitor of the progress of the reaction in this case by the quantum of hydrophilic groups, such as a hydroxyl group by an infrared absorption spectrum etc. Moreover, patterning not only by the approach using a photo mask 33 like drawing 2 (c) but laser scanning etc. is sufficient as pattern exposure.
[0040] Although it is desirable to use an ink jet method like Bubble Jet or a piezo jet method as for grant of the drop of the organic metal constituent 35 for electrodes (drawing 2 (d), (e)), it may carry out patterning of the base which carried out the coat of the whole in the resin constituent layer 32, and may use a dipping method which is immersed in said base 1 into the organic metal constituent 35 for electrodes.
[0041] 3) the pattern exposure same in the resin constituent layer 32 of the part in which the conductive film 4 should be formed as above 2 -- carrying out (drawing 3 (f)) -- the exposure part 36 -- the conductive film -- public funds -- give the group constituent 37 by the same approach as above 2 (drawing 3 (g)). The grant approach by patterning not only by an approach like a graphic display but laser scanning etc., a dipping method, etc. may be used like [this process] 2.
[0042] 4) Pyrolyze the base 1 formed by above 3 in the ambient atmosphere of the atmospheric-air middle class on a firing furnace or a hot plate.
[0043] Consequently, the metal constituents 35 and 37 turn into a metal or a metallic oxide, and the resin constituent layer 32 is almost removed. In this way, the component electrodes 2 and 3 and the conductive film 4 are formed (drawing 3 (h)).
[0044] 5) Next, perform energization processing called foaming. If it energizes between the component electrode 2 and 3, the electron emission section 5 will be formed in the part of the conductive film 4 (drawing 3 (i)). In a foaming process, heat energy concentrates locally on some conductive film 4 momentarily, and the electron emission section 5 from which structure changed is formed in the part.
[0045] The example of the voltage waveform of energization foaming is shown in drawing 4 .
[0046] Especially a voltage waveform has a desirable pulse shape. There are the technique of having shown the pulse which made the pulse height value the constant voltage to drawing 4 (a) impressed continuously, and technique shown in drawing 4 (b) which impresses a pulse while making a pulse height value increase in this.
[0047] First, drawing 4 (a) explains the case where a pulse height value is made into a constant voltage. T1 in drawing 4 (a) And T2 They are the pulse width and pulse separation of a voltage waveform. The peak value (peak voltage) of a chopping sea is suitably chosen according to the gestalt of an electron emission component. An electrical potential difference is impressed from the basis of such conditions, for example, several seconds, for dozens of minutes. Pulse shape is not limited to a chopping sea and the wave of requests, such as a square wave, can be used for it.
[0048] Next, drawing 4 (b) explains the case where an electrical-potential-difference pulse is impressed, making a pulse height value increase. T1 in drawing 4 (b) And T2 Suppose that it is the same with having been shown in drawing 4 (a). the peak value (peak voltage) of a chopping sea -- every [for example, / 0.1V step extent] -- it can be made to increase
[0049] Termination of energization foaming processing is pulse separation T2. The electrical potential difference of extent which does not destroy and transform the conductive film 4 into inside locally can be impressed, and a current can be measured and detected. For example, energization foaming is terminated, when the current which flows by electrical-potential-difference impression of an about

[0.1V] is measured, resistance is calculated and resistance of 1 M omega or more is shown.
[0050] Electrical treatment after foaming processing can be performed [carrying out within a vacuum processor as shown in drawing 5 , or]. This vacuum processor also has the function as measurement assessment equipment. Also in drawing 5 , the same sign as the sign given to drawing 1 is given to the same part as the part shown in drawing 1 .
[0051] In drawing 5 , 55 is a vacuum housing and 56 is an exhaust air pump. The electron emission component is allotted in the vacuum housing 55. Moreover, a high voltage power supply for an anode electrode for an ammeter for a power source for 51 to impress the component electrical potential difference Vf to an electron emission component and 50 to measure the component electrode 2 and the component current If which flows between three, and 54 to catch the emission current Ie emitted from the electron emission section 5 of a component, and 53 to impress an electrical potential difference to the anode electrode 54, and 52 are the ammeters for measuring the emission current Ie emitted from the electron emission section 5. As an example, the electrical potential difference of the anode electrode 54 can be made into the range of 1kV - 10kV, and measurement can be performed for the distance H of the anode electrode 54 and an electron emission component as range of 2mm - 8mm.
[0052] In the vacuum housing 55, the device required for the measurement under vacuum ambient atmospheres, such as a non-illustrated vacuum gage, is prepared, and measurement assessment under a desired vacuum ambient atmosphere can be performed now.
[0053] The exhaust air pump 56 is constituted by the usual high vacuum equipment system which consists of a turbine pump, a rotary pump, etc., and the ultra-high-vacuum equipment system which consists of an ion pump etc. The whole vacuum processor which arranged the electron emission component substrate shown here can be heated at a non-illustrated heater.
[0054] 6) Next, perform processing called an activation process to the component which finished foaming.
[0055] An activation process can be performed by repeating impression of a pulse between the component electrode 2 and 3 like energization foaming under the ambient atmosphere containing the gas of an organic substance, and the component current If and the emission current Ie come to change with these processings remarkably.
[0056] When the inside of a vacuum housing is exhausted using an oil diffusion pump, a rotary pump, etc., it can form using the organic gas which remains in an ambient atmosphere, and also the ambient atmosphere containing the gas of the organic substance in an activation process is acquired by introducing the gas of an organic substance suitable in the vacuum once exhausted fully with the ion pump which does not use oil. Since it changes with the gestalt of the above-mentioned component, the configuration of a vacuum housing, classes of organic substance, etc., the gas pressure of the desirable organic substance at this time is suitably set up according to a case.
[0057] As a suitable organic substance, an alkane, an alkene, and the aliphatic hydrocarbon of an alkyne Organic acids, such as aromatic hydrocarbon, alcohols, aldehydes, ketones, amines, a phenol, carvone, and a sulfonic acid, can be mentioned. Specifically The saturated hydrocarbon expressed with Cn H2n+2, such as methane, ethane, and a propane, The unsaturated hydrocarbon expressed with empirical formulas, such as Cn H2n, such as ethylene and a propylene, Benzene, toluene, a methanol, ethanol, formaldehyde, an acetaldehyde, an acetone, a methyl ethyl ketone, monomethylamine, ethylamine, a phenol, formic acid, an acetic acid, a propionic acid, etc. can be used.
[0058] Carbon or a carbon compound accumulates on a component, and the component current If and the emission current Ie come to change with these processings from the organic substance which exists in an ambient atmosphere remarkably.
[0059] Carbon or a carbon compound is graphite (it is what includes the so-called HOPG, and PG and GC). crystal grain is set to about 2nm, and, as for the thing and GC to which, as for the graphite crystal structure with nearly perfect HOPG, and PG, the crystal structure was confused a little by crystal grain by about 20nm, points out that it became large [turbulence of the crystal structure] further [that]. Amorphous carbon (the mixture of amorphous carbon and amorphous carbon, and the microcrystal of said graphite is pointed out.) it is -- as for the thickness, it is desirable to consider as the range of 50nm

or less, and it is more desirable to consider as the range of 30nm or less.
[0060] The termination judging of an activation process can be performed suitably, measuring the component current If and the emission current Ie.
[0061] 7) As for the electron emission component pass such a process, it is desirable to perform a stabilization process. This process is a process which exhausts the organic substance in a vacuum housing. As for the evacuation equipment which exhausts a vacuum housing, it is desirable to use what does not use oil so that the oil generated from equipment may not affect the property of a component. Specifically, evacuation equipments, such as a sorption pump and an ion pump, can be mentioned.
[0062] The partial pressure of the organic component in a vacuum housing has 10 - 6 or less desirable Pa at the partial pressure which the above-mentioned carbon or a carbon compound does not almost newly deposit, and below its 10-10 Pa is desirable to especially a pan. When exhausting the inside of a vacuum housing furthermore, it is desirable to make easy to heat the whole vacuum housing and to exhaust a vacuum housing wall and the organic substance molecule which stuck to the electron emission component. Although the heating conditions at this time are 150 degrees C or more preferably and it is desirable to carry out long duration processing as much as possible 80-250 degrees C, they are not restricted to especially this condition and the conditions suitably chosen according to terms and conditions, such as magnitude of a vacuum housing and a configuration of a configuration and an electron emission component, perform them. The pressure in a vacuum housing needs to make it low as much as possible, its 10 - 5 or less Pa is desirable, and especially its further 10 - 6 or less Pa is desirable.

[0063] Although it is desirable to maintain the ambient atmosphere at the time of the above-mentioned stabilizing treatment termination as for the ambient atmosphere at the time of actuation after performing a stabilization process, if it does not restrict to this and the organic substance is removed enough, even if some pressure itself rises, it can maintain a sufficiently stable property. By adopting such a vacuum ambient atmosphere, deposition of new carbon or a carbon compound can be controlled, and the component current If and the emission current Ie are stabilized as a result.
[0064] The basic property of the electron emission component of this invention "pass the process mentioned above" is explained referring to drawing 5 .
[0065] Drawing 6 is drawing having shown typically relation with the component electrical potential difference Vf with the emission current Ie and the component current If which were measured using the vacuum processor shown in drawing 5 . Since the emission current Ie is remarkably small compared with the component current If, drawing 6 is shown per arbitration. In addition, length and an axis of abscissa are linear scales.
[0066] The electron emission component of this invention has the following three characteristic qualities about the emission current Ie so that clearly also from drawing 6 .
[0067] That is, if this component impresses the component electrical potential difference more than a certain electrical potential difference (; called threshold voltage Vth in drawing 6), the emission current Ie will increase rapidly and, on the other hand, the emission current Ie will hardly be detected by the 1st below with the threshold voltage Vth. That is, it is a nonlinear element with the clear threshold voltage Vth to the emission current Ie.
[0068] Since the emission current Ie carries out monotonous increment dependence at the component electrical potential difference Vf, the emission current Ie is [2nd] controllable by the component electrical potential difference Vf.
[0069] It depends for the bleedoff charge caught by the anode electrode 54 (refer to drawing 5) the 3rd on the time amount which impresses the component electrical potential difference Vf. That is, the amount of charges caught by the anode electrode 54 is controllable by the time amount which impresses the component electrical potential difference Vf.
[0070] The electron emission component of this invention can control the electron emission characteristic easily according to an input signal to be understood from the above explanation. If this property is used, an electron source, image formation equipment, etc. which allotted and constituted two or more electron emission components will become applicable to the direction of many.

[0071] In drawing 6 , although the example in which the component current If carries out a monotonous increment to the component electrical potential difference Vf (MI property) is shown, the component current If may show voltage-controlled negative resistance characteristics (VCNR property) to the component electrical potential difference Vf (un-illustrating). These properties are controllable by controlling the above-mentioned process.
[0072] Next, the application of the electron emission component of this invention is described below. Two or more electron emission components of this invention are arranged on a substrate, for example, an electron source and image formation equipment can be constituted.
[0073] About the array of an electron emission component, various things are employable. There is a thing of the ladder-like arrangement which carries out control actuation of the electron from an electron emission component with the control electrode (it is also called a grid) which connected as an example each of the electron emission component of a large number arranged to juxtaposition at both ends, allotted many lines of an electron emission component (it is called a line writing direction), and was arranged above this electron emission component towards intersecting perpendicularly with this wiring (it being called the direction of a train). What connects one side of the electrode of two or more electron emission components which allotted two or more electron emission components in the direction of X and the direction of Y in the shape of a matrix, and were allotted to the same line apart from this common to wiring of the direction of X, and connects another side of the electrode of two or more electron emission components allotted to the same train common to wiring of the direction of Y is mentioned. Such a thing is the so-called passive-matrix arrangement. Passive-matrix arrangement is explained in full detail below first.
[0074] About the electron emission component of this invention, there are three properties as mentioned above. That is, the emission electron from a surface conduction mold electron emission component is controllable by the peak value and width of face of a pulse-like electrical potential difference which are impressed to the component inter-electrode which counters above threshold voltage. On the other hand, it is hardly emitted below with threshold voltage. If a pulse-like electrical potential difference is suitably impressed to each component when many electron emission components have been arranged according to this property, according to an input signal, a surface conduction mold electron emission component is chosen, and the amount of electron emission can be controlled.
[0075] The electron source substrate which allots two or more electron emission components of this invention, and is obtained based on this principle below is explained using drawing 7 . As for an electron source substrate and 72, in drawing 7 , 71 is [the direction wiring of X and 73] the direction wiring of Y. 74 is an electron emission component and 75 is connection.
[0076] The direction wiring 72 of X of m consists of Dx1, Dx2, ..., Dxm, and can consist of conductive metals formed using a vacuum deposition method, print processes, a spatter, etc. The ingredient of wiring, thickness, and width of face are designed suitably. The direction wiring 73 of Y is Dy1 and Dy2.... It consists of wiring of n of Dyn, and is formed like the direction wiring 72 of X. The non-illustrated layer insulation layer is prepared between the direction wiring 72 of X of these m, and the direction wiring 73 of Y of n, and both are separated electrically (m and n are both a forward integer).
[0077] SiO2 in which the non-illustrated layer insulation layer was formed using a vacuum deposition method, print processes, a spatter, etc. etc. -- it is constituted. For example, it is formed in the whole surface or some of substrate 71 in which the direction wiring 72 of X was formed, in a desired configuration, and thickness, an ingredient, and a process are suitably set up so that the potential difference of the intersection of the direction wiring 72 of X and the direction wiring 73 of Y can be borne especially. The direction wiring 72 of X and the direction wiring 73 of Y are pulled out as an external terminal, respectively.
[0078] The component electrode (un-illustrating) of the couple which constitutes the electron emission component 74 is electrically connected to the direction wiring 72 of X of m, and the direction wiring 73 of Y of n by the connection 75 which consists of a conductive metal etc., respectively.
[0079] The ingredient which constitutes the ingredient which constitutes wiring 72 and wiring 73, the ingredient which constitutes connection 75, and the component electrode of a couple may have same

some or all of the configuration element, or may differ, respectively. These ingredients are suitably chosen from the ingredient of the above-mentioned component electrode. When the ingredient and wiring material which constitute a component electrode are the same, wiring linked to a component electrode can also be called component electrode.

[0080] A scan signal impression means by which it does not illustrate [which impresses the scan signal for choosing the line of the electron emission component 74 arranged in the direction of X] is connected to the direction wiring 72 of X. On the other hand, a modulating-signal generating means for modulating each train of the electron emission component 74 arranged in the direction of Y according to an input signal by which it does not illustrate is connected to the direction wiring 73 of Y. The driver voltage impressed to each electron emission component is supplied as a difference electrical potential difference of the scan signal impressed to the component concerned, and a modulating signal.

[0081] In the above-mentioned configuration, using simple matrix wiring, the component according to individual can be chosen and actuation can be made independently possible.

[0082] The image formation equipment constituted using the electron source of such passive-matrix arrangement is explained using drawing 8 , drawing 9 , and drawing 10 . Drawing 8 is the mimetic diagram showing an example of the display panel of image formation equipment, and drawing 9 is the mimetic diagram of the fluorescent screen used for the image formation equipment of drawing 8 . Drawing 10 is the block diagram showing an example of the actuation circuit for displaying according to the TV signal of NTSC system.

[0083] In drawing 8 , the electron source substrate with which 71 allotted two or more electron emission components, the rear plate with which 81 fixed the electron source substrate 71, and 86 are the face plates with which the fluorescent screen 84 and the metal back 85 grade were formed in the inner surface of a glass substrate 83. 82 is a housing and the rear plate 81 and the face plate 86 are connected to this housing 82 using frit glass etc. 88 is an envelope, for example, is calcinating more than for 10 minutes in a 400-500-degree C temperature requirement in atmospheric air or nitrogen, and is sealed and constituted.

[0084] 74 is an electron emission component as shown in drawing 1 . 72 and 73 are the direction wiring of X and the direction wiring of Y which were connected with the component electrode of the couple of a surface conduction mold electron emission component.

[0085] An envelope 88 consists of a face plate 86, a housing 82, and a rear plate 81 like ****. Since it is prepared in order to mainly reinforce the reinforcement of a substrate 71, the rear plate 81 can be made unnecessary [the rear plate 81 of another object] when it has reinforcement sufficient by substrate 71 the very thing. That is, the direct housing 82 is sealed in a substrate 71, and an envelope 88 may consist of a face plate 86, a housing 82, and a substrate 71. The envelope 88 which has sufficient reinforcement to atmospheric pressure by installing the base material which is not illustrated [which is called a spacer] between a face plate 86 and the rear plate 81 on the other hand can also be constituted.

[0086] Drawing 9 is the mimetic diagram showing a fluorescent screen. In the case of monochrome, a fluorescent screen 84 can consist of only fluorescent substances. In the case of the fluorescent screen of a color, the array of a fluorescent substance can constitute from the black electric conduction material 91 and fluorescent substance 92 which are called a black stripe (drawing 9 (a)) or a black matrix (drawing 9 (b)). In the case of color display, the object which establishes a black stripe and a black matrix is to control [it not being conspicuous and carrying out color mixture etc. by distinguishing by different color between each fluorescent substance 92 of a needed three-primary-colors fluorescent substance with, and making the section black, and] lowering of the contrast by the outdoor daylight echo in a fluorescent screen 84. There is conductivity besides the ingredient which uses the graphite usually used as a principal component as an ingredient of the black electric conduction material 91, and transparency and echo of light can use few ingredients.

[0087] The approach of applying a fluorescent substance to a glass substrate 83 is not based on monochrome and a color, but a precipitation method, print processes, etc. can be used for it. The metal back 85 is usually formed in the inner surface side of a fluorescent screen 84. The objects which prepare the metal back are making it act as an electrode for impressing raising brightness and electron beam

acceleration voltage, protecting a fluorescent substance from the damage by the collision of the anion generated within the envelope, etc. by carrying out specular reflection of the light by the side of an inner surface to a face plate 86 side among luminescence of a fluorescent substance. The metal back performs data smoothing (usually called "filming".) of the inner surface side front face of a fluorescent screen after fluorescent screen production, and it can produce by making aluminum deposit using vacuum deposition etc. after that.

[0088] In order to raise the conductivity of a fluorescent screen 84 to a face plate 86 further, a transparent electrode (un-illustrating) may be prepared in the outside surface side of a fluorescent screen 84.

[0089] In case the above-mentioned sealing is performed, the case of a color needs to make each color fluorescent substance and an electron emission component correspond, and becomes indispensable [sufficient alignment].

[0090] The image formation equipment shown in drawing 8 is manufactured as follows, for example.

[0091] after exhausting the inside of an envelope 88 through a non-illustrated exhaust pipe with the exhauster which heats suitably and does not use oil, such as an ion pump and a sorption pump, inside and making it into enough few ambient atmospheres of the organic substance of the degree of vacuum of about 10 - 5Pa, closure accomplishes it. Getter processing can also be performed in order to maintain the degree of vacuum after closure of an envelope 88. This is processing which heats the getter (un-illustrating) arranged at the position in an envelope 88, and forms the vacuum evaporationo film with heating which used resistance heating or high-frequency heating after closure just before closing the envelope 88. Ba etc. is usually a principal component and a getter maintains the degree of vacuum of 1x10 - 5 or more Pa by the absorption of this vacuum evaporationo film. Here, the process after foaming processing of an electron emission component can be set up suitably.

[0092] Next, the example of a configuration of the actuation circuit for performing the television display based on the TV signal of NTSC system is explained to the display panel constituted using the electron source of passive-matrix arrangement using drawing 10 . drawing 10 -- setting -- 101 -- an image display panel and 102 -- for a shift register and 105, line memory and 106 are [a scanning circuit and 103 / a control circuit and 104 / a modulating-signal generator, and Vx and Va of a synchronizing signal separation circuit and 107] direct current voltage supplies.

[0093] The display panel 101 is connected with the external electrical circuit through a terminal Dox1 thru/or Doxm, a terminal Doy1 or Doyn, and a secondary terminal 87. The scan signal for carrying out one-line [every] (n elements) sequential actuation of the electron emission elements by which matrix wiring was carried out is impressed at a terminal Dox1 thru/or Doxm to the electron source established in the display panel 101, i.e., the letter of a matrix of a m line n train. The modulating signal for controlling the output electron beam of each component of the electron emission component of one line chosen by said scan signal is impressed to a terminal Doy1 thru/or Doyn. Although the direct current voltage of 10kV is supplied to a secondary terminal 87 from direct current voltage supply Va, this is the acceleration voltage for giving sufficient energy exciting a fluorescent substance to the electron beam emitted from an electron emission component.

[0094] A scanning circuit 102 is explained. This circuit equips the interior with m switching elements (S1 thru/or Sm show typically among drawing). Each switching element chooses the output voltage of the direct-current-voltage power source Vx, or either of 0 [V] (grand level), and is connected to the terminal Dox1 thru/or Doxm and an electric target of a display panel 101. Each switching element S1 thru/or Sm can operate based on the control signal Tscan which a control circuit 103 outputs, and can be constituted by combining a switching element like FET for example.

[0095] In this example, direct current voltage supply Vx are set up so that a fixed electrical potential difference which the driver voltage impressed to the component which is not scanned turns into below electron emission threshold voltage may be outputted based on the property (electron emission threshold voltage) of an electron emission component.

[0096] A control circuit 103 has the function to adjust actuation of each part so that a suitable display may be performed based on the picture signal inputted from the exterior. A control circuit 103 generates

each control signal of Tscan, Tsft, and Tmry to each part based on the synchronizing signal Tsync sent from the synchronizing signal separation circuit 106.
[0097] The synchronizing signal separation circuit 106 is a circuit for separating a synchronizing signal component and a luminance-signal component, and can consist of TV signals of the NTSC system inputted from the outside using a general frequency-separation (filter) circuit etc. The synchronizing signal separated by the synchronizing signal separation circuit 106 was illustrated as a Tsync signal after [expedient] explaining here, although it consisted of the Vertical Synchronizing signal and the Horizontal Synchronizing signal. The luminance-signal component of the image separated from said TV signal was expressed as the DATA signal for convenience. This DATA signal is inputted into a shift register 104.
[0098] It operates based on the control signal Tsft which a shift register 104 is for carrying out serial/parallel conversion of said DATA signal inputted serially for every line of an image, and is sent from said control circuit 103 (that is, you may put it in another way as a control signal Tsft being the shift clock of a shift register 104.). The data for the image of one line by which serial/parallel conversion was carried out (equivalent to the actuation data for n electron emission components) are outputted from said shift register 104 as a parallel signal of Id1 thru/or n ** of Idn.
[0099] The line memory 105 is storage for between need time amount to memorize the data for the image of one line, and memorizes the content of Id1 thru/or Idn suitably according to the control signal Tmry sent from a control circuit 103. The memorized content is outputted as Id'1 thru/or Id'n, and is inputted into the modulating-signal generator 107.
[0100] The modulating-signal generator 107 is a source of a signal for carrying out the actuation modulation of each of an electron emission component appropriately according to each of image data Id'1 thru/or Id'n, and the output signal is impressed to the electron emission component in a display panel 101 through a terminal Doy1 thru/or Doyn.
[0101] As mentioned above, the electron emission component of this invention has the following basic properties about the emission current Ie. That is, there is clear threshold voltage Vth in electron emission, and only when the electrical potential difference more than Vth is impressed, electron emission arises. To the electrical potential difference beyond an electron emission threshold, the emission current also changes according to change of the applied voltage to a component. When impressing a pulse-like electrical potential difference to this component, for example, even if it impresses the electrical potential difference below electron emission threshold voltage, electron emission is not produced from this, but an electron beam is outputted when impressing the electrical potential difference more than electron emission threshold voltage. It is possible in that case to control the reinforcement of an output electron beam by changing the peak value Vm of a pulse. Moreover, it is possible by changing the width of face Pw of a pulse to control the total amount of the charge of the electron beam outputted.
[0102] Therefore, as a method which modulates an electron emission component according to an input signal, an electrical-potential-difference modulation technique, pulse width modulation, etc. are employable. It faces carrying out an electrical-potential-difference modulation technique, and as a modulating-signal generator 107, the electrical-potential-difference pulse of fixed die length is generated, and the circuit of the electrical-potential-difference modulation technique which can modulate the peak value of an electrical-potential-difference pulse suitably according to the data inputted can be used. It faces carrying out pulse width modulation and the circuit of pulse width modulation which generates the electrical-potential-difference pulse of fixed peak value as a modulating-signal generator 107, and modulates the width of face of an electrical-potential-difference pulse suitably according to the data inputted can be used.
[0103] The thing of a digital signal type or the thing of an analog signal type can also be used for a shift register 104 or the line memory 105. It is because serial/parallel conversion and storage of a picture signal should just be performed at the rate of predetermined.
[0104] What is necessary is just to form an A/D converter in the output section of the synchronizing signal separation circuit 106 at this, although it is in the need of digital-signal-izing the output signal

DATA of the synchronizing signal separation circuit 106 in using a digital signal type. The circuit where the output signal of the line memory 105 is used for the modulating-signal generator 107 by the digital signal or the analog signal in relation to this becomes a different thing a little. That is, in the case of the electrical-potential-difference modulation technique using a digital signal, an amplifying circuit etc. is added to the modulating-signal generator 107 if needed for example, using a D/A conversion circuit. In the case of pulse width modulation, the circuit which combined the comparator (comparator) which compares with the output value of said memory the output value of the counter (counter) which carries out counting of the wave number which a high-speed oscillator and an oscillator output, and a counter is used for the modulating-signal generator 107. The amplifier for amplifying the voltage of the modulating signal which a comparator outputs and by which Pulse Density Modulation was carried out even to the driver voltage of an electron emission component if needed can also be added.

[0105] In the case of the electrical-potential-difference modulation technique using an analog signal, the amplifying circuit which used the operational amplifier etc. can be adopted as the modulating-signal generator 107, and a level shift circuit etc. can also be added to it if needed. In the case of pulse width modulation, for example, a voltage-controlled oscillator circuit (VCO) can be adopted, and the amplifier for amplifying the voltage even to the driver voltage of an electron emission component if needed can also be added to it.

[0106] In the image formation equipment of this invention which can take such a configuration, electron emission arises by impressing an electrical potential difference to each electron emission component through the container outer edge child Dox1 thru/or Doxm, Doy1, or Doyn. High voltage is impressed to the metal back 85 or a transparent electrode (un-illustrating) through a secondary terminal 87, and an electron beam is accelerated. The accelerated electron collides with a fluorescent screen 84, luminescence produces it, and an image is formed.

[0107] The configuration of the image formation equipment described here is an example of the image formation equipment of this invention, and various deformation is possible for it based on the technical thought of this invention. Although NTSC system was held about the input signal, an input signal is not restricted to this and can also adopt TV signal (for example, high definition TV including MUSE) method which consists of much scanning lines rather than these besides being PAL, an SECAM system, etc.

[0108] Next, the above-mentioned electron source and the image formation equipment of ladder mold arrangement are explained using drawing 11 and drawing 12 .

[0109] Drawing 11 is the mimetic diagram showing an example of the electron source of ladder mold arrangement. In drawing 11 , 110 is an electron source substrate and 111 is an electron emission component. 112 is the common wiring Dx1-Dx10 for connecting the electron emission component 111, and these are pulled out as an external terminal. Two or more electron emission components 111 are arranged in the direction of X at juxtaposition at the substrate 110 top (this is called a component line). Two or more these component lines are arranged, and constitute the electron source. Each component line can be made to drive independently by impressing driver voltage between common wiring of each component line. That is, the electrical potential difference beyond an electron emission threshold is impressed to a component line to make it emit an electron beam, and the electrical potential difference below an electron emission threshold is impressed to a component line to make it emit an electron beam. The common wiring Dx2-Dx9 located in each component space can also consider Dx2, Dx3 and Dx4, Dx5 and Dx6, and Dx7, Dx8 and Dx9 as the same wiring of one, respectively.

[0110] Drawing 12 is the mimetic diagram showing an example of the panel structure in image formation equipment equipped with the electron source of ladder mold arrangement. Opening for a grid electrode to pass 120 and for an electron pass 121, Dox1, or Doxm is the container outer edge child by whom a container outer edge child, G1, or Gn was connected with the grid electrode 120. 110 is the electron source substrate which considered common wiring of each component space as the same wiring. In drawing 12 , the same sign as having given these drawings is given to the same part as the part shown in drawing 8 and drawing 11 . The big difference between the image formation equipment shown here and the image formation equipment of the passive-matrix arrangement shown in drawing 8

is whether to have the grid electrode 120 between the electron source substrate 110 and the face plate 86.
[0111] In drawing 12 , the grid electrode 120 is formed between the substrate 110 and the face plate 86. The grid electrode 120 is for modulating the electron beam emitted from the electron emission component 111, and in order to make the electrode of the shape of a stripe established by intersecting perpendicularly with the component line of ladder mold arrangement pass an electron beam, corresponding to each component, the opening 121 circular one piece at a time is formed. The configuration or arrangement location of a grid electrode are not limited to what was shown in drawing 11 . For example, much passage openings can also be prepared in the shape of a mesh as opening, and a grid electrode can also be prepared a perimeter and near the electron emission component.
[0112] The container outer edge child Dox1 thru/or Doxm and the grid container outer edge child G1 thru/or Gn are connected to non-illustrated a control circuit and an electric target.
[0113] With the image formation equipment of this example, the modulating signal for the image of one line is simultaneously impressed to a grid electrode train synchronizing with carrying out sequential actuation (scan) of the one every train of the component lines, and going. Thereby, the exposure to the fluorescent substance of each electron beam can be controlled, and it can display the image of one line at a time.
[0114] The image formation equipment of this invention explained above can be used also as image formation equipment as an optical printer constituted using the photosensitive drum besides indicating equipments, such as an indicating equipment of television broadcasting, a video conference system, and a computer, etc.
[0115]
[Example] Although a concrete example is given to below and this invention is explained to it, this invention is not limited to these examples and also includes that by which the permutation and design change of each element within the limits by which the object of this invention is attained were made.
[0116] The fundamental configuration of the electron emission component concerning [example 1] this example is the same as that of drawing 1 . Drawing 13 is a base which has arranged the ten same electron emission components as drawing 2 . Moreover, the manufacturing method of the electron emission component in this example is the same as that of drawing 2 and drawing 3 fundamentally. Hereafter, order is explained for the manufacture approach of the electron emission component in this example later on using drawing 1 - drawing 3 , and drawing 13 .
[0117] On the defecated process-a blue plate glass base 1, the ink jet equipment (piezo jet printer made from Canon, Inc. FP510) of a piezo jet method gave the toluene solution which dissolved methylphenyl polysilane 3% by weight concentration, prebaking for 20 minutes was performed at 90 degrees C, and the resin constituent layer 32 was formed. The above-mentioned solution was given to the same part of a base 1 8 times, and the resin constituent layer 32 formed it in it so that it might become larger than the field which should form the component electrodes 2 and 3 and the conductive film 4 (drawing 2 (a), (b)).
[0118] Pattern exposure was performed in the resin constituent layer 32 of the part in which the -b process electrodes 2 and 3 should be formed (drawing 2 (c)), the ink jet equipment (bubble-jet printer [by Canon, Inc.] head BC- 01) of Bubble Jet gave the drop of the water solution of the presentation later mentioned into the exposure part 34 to the same part 4 times (drawing 2 (d), (e)), and ink desiccation for 10 minutes was performed at 90 degrees C. In addition, pattern exposure was carried out and the drop was given so that the component electrode spacing L might be set to 30 micrometers.
[0119] The presentation of the above-mentioned water solution is the solution which dissolved the tetra-monoethanolamine-platinum acetic acid (Pt(NH2 CH2 CH2 OH)4 2 (CH3 COO)) in the water solution in which 0.05% of weight concentration and 2-propanol were dissolved for polyvinyl alcohol, and it dissolved 1% of weight concentration for 15% of weight concentration, and a glycerol so that platinum weight concentration might become about 0.75%.
[0120] Pattern exposure was performed in the resin constituent layer 32 of the part in which the process-c conductivity film 4 should be formed (drawing 3 (f)), the ink jet equipment (Canon (stock) bubble-jet

printer head BC-01) of Bubble Jet gave the drop of the water solution of the presentation later mentioned into the exposure part 36 to the same part 4 times (drawing (g)), and ink desiccation for 10 minutes was performed at 90 degrees C.
[0121] The presentation of the above-mentioned water solution is the solution which dissolved the tetra-monoethanolamine-palladium acetic acid (Pd(NH2 CH2 CH2 OH)4 2 (CH3 COO)) in the water solution in which 0.05% of weight concentration and 2-propanol were dissolved for polyvinyl alcohol, and it dissolved 1% of weight concentration for 15% of weight concentration, and a glycerol so that palladium weight concentration might become about 0.15%.
[0122] The sample created by process-d process-c was calcinated among atmospheric air at 480 degrees C. In this way, the conductive film 4 which consists of component electrodes 2 and 3 which consist of formed Pt, and PdO was formed. The component electrodes 2 and 3 and the conductive film 4 were formed on the base 1 according to the above process.
[0123] Next, the base of this example which finished Process d was installed in the vacuum processor of drawing 5 R> 5. It exhausted to the degree of vacuum of 1.3x10 to 6 Pa with the vacuum pump.
[0124] This vacuum processor not only can perform a foaming process, an activation process, and a stabilization process, but has the function as measurement assessment equipment.
[0125] In drawing 5 , 55 is a vacuum housing and 56 is an exhaust air pump. The electron emission component is allotted in the vacuum housing 55. 1 is a base which constitutes an electron emission component, and, as for a component electrode and 4, 2 and 3 are [the conductive film and 5] the electron emission sections. An ammeter for a power source for 51 to impress the component electrical potential difference Vf to an electron emission component and 50 to measure the component current If which flows the component electrode 2 and the conductive film 4 between three, and 54 are the anode electrodes for catching the emission current Ie emitted from the electron emission section. A high voltage power supply for 53 to impress an electrical potential difference to the anode electrode 54 and 52 are the ammeters for measuring the emission current Ie emitted from the electron emission section 5.
[0126] As an example, the electrical potential difference of an anode electrode can be made into the range of 1kV - 10kV, and measurement can be performed for the distance H of an anode electrode and an electron emission component as range of 2mm - 8mm. Moreover, 57 is a source of the organic generation of gas used in case an activation process is performed.
[0127] In the vacuum housing 55, the device required for the measurement under vacuum ambient atmospheres, such as a non-illustrated vacuum gage, is prepared, and measurement assessment under a desired vacuum ambient atmosphere can be performed now. The ultra-high-vacuum equipment system which consists of a TAPO pump, a dry pump, an ion pump, etc. constituted the exhaust air pump 56. The whole vacuum processor which arranged the electron source base shown here can be heated to 350 degrees C at a non-illustrated heater.
[0128] Process - The foaming process was given within e, then the vacuum processor of drawing 5 . The crack was formed in the part of the conductive film 4 when energized between the component electrode 2 and 3. The voltage waveform of energization foaming is pulse shape, and impressed the electrical-potential-difference pulse to which a pulse height value is made to increase from 0V at 0.1V step. The pulse width and pulse separation of a voltage waveform were made into the square wave set to 1msec and 10msec, respectively. Termination of energization foaming processing was considered as the time of the resistance of the conductive film showing 1 M omega or more.
[0129] The foaming wave used for drawing 14 by this example is shown. In addition, in the component electrodes 2 and 3, an electrical potential difference is impressed by making another side into a high potential side, using one electrode as low voltage.
[0130] Processing called an activation process was performed for the component which finished process-f foaming. As mentioned above, an activation process is forming carbon and a carbon compound in the high resistance section formed by foaming, and the component current If and the emission current Ie are the processes which change remarkably.
[0131] The activation process introduced acetone gas up to 1.3x10 to 1 Pa to the measuring device, and repeated the impression of the pulse of a square wave set to pulse height value 15V, pulse width 1msec,

and pulse-separation 10msec for 20 minutes.
[0132] The pulse shape used for drawing 15 at the activation process is shown. In this example, it impressed so that low and high potential might interchange for every pulse separation by turns to the component electrodes 2 and 3.
[0133] Process - g, then a stabilization process were performed. A stabilization process is a process which exhausts the organic gas which exists in the ambient atmosphere in a vacuum housing etc., controls deposition of carbon or a carbon compound, and stabilizes the component current If and the emission current Ie. The whole vacuum housing was heated at 250 degrees C, and the organic substance molecule which stuck to the vacuum housing wall or the electron emission component was exhausted. At this time, the degree of vacuum was 1.3x10 to 6 Pa.
[0134] Then, the property of an electron emission component was measured with this degree of vacuum. The component current If was 1.5mA and the emission current Ie of the electron emission characteristic was 1.3microA.
[0135] [Example 2] this example is an example which created image formation equipment. Drawing 16 (a) is the mimetic diagram showing some top views of an electron source, and (b) is the sectional view showing some electron emission components. As for the conductive film, and 192 and 193, in drawing 16 , the direction wiring of a train corresponding to ** Dyn in line writing direction wiring corresponding to Dxm in 198 corresponding to a base in 191 and 199 and 194 are [a component electrode and 197] layer insulation layers. Although the image formation equipment of this example was the same as that of drawing 8 , the base was used as a rear plate. Drawing 10 is the example of a configuration of the actuation circuit for performing the television display based on the TV signal of NTSC system.
[0136] Next, the manufacture approach of image formation equipment is concretely explained according to the order of a process.
[0137] The train wiring 199 was created with screen printing on the process blue plate glass base 1 defecated -one time. Next, the layer insulation layer 197 with a thickness of 1.0 micrometers was created with screen printing. Furthermore, the line wiring 198 was printed.
[0138] on the blue plate glass 1 in which process -2 wiring be formed, the ink jet equipment (piezo jet printer by Canon, Inc. FP-510) of a piezo jet method gave the toluene solution which dissolved methylphenyl polysilane 3% by weight concentration so that it might become larger than the field which should form the component electrodes 2 and 3 and the conductive film 4, prebaking for 20 minutes be performed at 90 degrees C, and the resin constituent layer 32 be formed. The above-mentioned solution was given to the same part of a base 8 times, and the resin constituent layer 32 formed it in it so that it might become larger than the field which should form the component electrodes 2 and 3 and the conductive film 4 (drawing 2 (a), (b)).
[0139] Pattern exposure was performed in the resin constituent layer 32 of the part in which the -three process electrodes 2 and 3 should be formed (drawing 2 (c)), the ink jet equipment (bubble-jet printer [by Canon, Inc.] head BC- 01) of Bubble Jet gave the drop of the water solution of the presentation later mentioned into the exposure part 34 to the same part 4 times (drawing 2 (d), (e)), and ink desiccation for 10 minutes was performed at 90 degrees C. In addition, the component electrode spacing L carried out pattern exposure, and gave the drop so that the width of face W of 20 micrometers and a component electrode might be set to 125 micrometers.
[0140] The presentation of the above-mentioned water solution is the solution which dissolved the tetra-monoethanolamine-platinum acetic acid (Pt(NH2 CH2 CH2 OH)4 2 (CH3 COO)) in the water solution in which 0.05% of weight concentration and 2-propanol were dissolved for polyvinyl alcohol, and it dissolved 1% of weight concentration for 15% of weight concentration, and a glycerol so that platinum weight concentration might become about 0.75%.
[0141] Pattern exposure was performed in the resin constituent layer 32 of the part in which the process-4 conductivity film 4 should be formed (drawing 3 (f)), the ink jet equipment (bubble-jet printer head by Canon, Inc. BC-01) of Bubble Jet gave the drop of the water solution of the presentation later mentioned into the exposure part 36 to the same part 4 times (drawing 3 (g)), and ink desiccation for 10

minutes was performed at 90 degrees C.
[0142] The presentation of the above-mentioned water solution is the solution which dissolved the tetra-monoethanolamine-palladium acetic acid (Pd(NH2 CH2 CH2 OH)4 2 (CH3 COO)) in the water solution in which 0.05% of weight concentration and 2-propanol were dissolved for polyvinyl alcohol, and it dissolved 1% of weight concentration for 15% of weight concentration, and a glycerol so that palladium weight concentration might become about 0.15%.
[0143] The sample created at process -5 process -4 was calcinated among atmospheric air at 480 degrees C. In this way, the conductive film 4 which consists of component electrodes 2 and 3 which consist of formed Pt, and PdO was formed. The component electrodes 2 and 3, the conductive film 4, etc. were formed on the base 1 according to the above process.
[0144] The process -6, next the face plate were formed. The fluorescent screen and the metal back by whom the fluorescent substance has been arranged were formed in the inner surface of a glass base, and the face plate was considered as the configuration. The array of a fluorescent substance prepared each black stripe between fluorescent substances of a three-primary-colors fluorescent substance. The ingredient which uses the graphite usually used as a principal component as an ingredient of a black stripe was used. Each of these was formed with screen printing.
[0145] Process -7 process - The face plate was sealed through the housing by using as a rear plate the base formed by 1-5. a housing -- beforehand -- a connoisseur -- the exhaust pipe used for exhaust air was pasted up.
[0146] Foaming was performed for every line after exhaust air to the -81.3x10 to 5 Pa process by the manufacturing installation which can supply an electrical potential difference to each component from each wiring Dxm and Dyn. The conditions of foaming are the same as an example 1.
[0147] The acetone was introduced from the exhaust pipe up to 1.3x10 to 1 Pa after exhaust air to the -91.3x10 to 5 Pa process, and by the manufacturing installation which can supply an electrical potential difference to each component from each wiring Dxm and Dyn, the electrical potential difference was impressed so that a **** scan might be impressed to the same pulse voltage as an example 1 by each component, and the activation process was performed. The activation process was ended, when electrical-potential-difference impression of [for / each / line / 25 minutes] was carried out and a component current was set to 3mA on an average also with each line.
[0148] After fully performing exhaust air from a process -10, then an exhaust pipe, it exhausted heating the whole container at 250 degrees C for 3 hours. The flash plate of the getter was carried out to the last, and the exhaust pipe was closed.
[0149] The example of a configuration of the actuation circuit for performing the television display based on the TV signal of NTSC system to the image formation equipment constituted using the electron source of the passive-matrix array created as mentioned above is as having explained in said drawing 10 .
[0150] [Example 3] drawing 17 is drawing showing an example of the image formation equipment of this invention constituted so that the image information with which a display panel (drawing 8) is provided from the various sources of image information which make television broadcasting the start could be displayed.
[0151] 201 in drawing -- a display panel and 1001 -- the actuation circuit of a display panel, and 1002 -- a display controller and 1003 -- a multiplexer and 1004 -- a decoder and 1005 -- as for an image close KAINTA face circuit, and 1012 and 1013, for an image generation circuit, 1008, and 1009 and 1010, an image memory interface circuitry and 1011 are [an ON appearance KAINTA face circuit and 1006 / CPU and 1007 / TV signal receive circuit and 1014] the input sections.
[0152] In addition, although this image formation equipment naturally reproduces voice to a display and coincidence of an image when receiving the signal containing both image information and speech information like a television signal, it omits explanation about a circuit, a loudspeaker, etc. about reception, separation, playback, processing, storage, etc. of the speech information which is not directly related to the description of this invention.
[0153] Hereafter, the function of each part is explained in accordance with the flow of a picture signal.

[0154] First, the TV signal receive circuit 1013 is a circuit for receiving TV signal transmitted using radio-transmission systems, such as an electric wave and space optical communication.
[0155] Especially the method of TV signal to receive may not be restricted and which methods, such as NTSC system, a PAL system, and an SECAM system, are sufficient as it. Moreover, the so-called high definition TV which makes the start TV signal which consists of these from much scanning lines further, for example, MUSE, is a suitable source of a signal to employ the advantage of said display panel suitable for large-area-izing or large pixel number-ization efficiently.
[0156] TV signal received by the TV signal receive circuit 1013 is outputted to a decoder 1004.
[0157] The TV signal receive circuit 1012 is a circuit for receiving TV signal transmitted using cable-transmission systems, such as a coaxial cable and an optical fiber. Like said TV signal receive circuit 1013, especially the method of TV signal to receive is not restricted and TV signal received in this circuit is also outputted to a decoder 1004.
[0158] The picture signal which the image close KAINTA face circuit 1011 is a circuit for incorporating the picture signal supplied from picture input devices, such as a TV camera and an image reading scanner, and was incorporated is outputted to a decoder 1004.
[0159] The picture signal which the image memory interface circuitry 1010 is a circuit for incorporating the picture signal memorized by the video tape recorder (it omits Following VTR), and was incorporated is outputted to a decoder 1004.
[0160] The picture signal which the image memory interface circuitry 1009 is a circuit for incorporating the picture signal memorized by the videodisk, and was incorporated is outputted to a decoder 1004.
[0161] The static-image data which are a circuit for incorporating a picture signal and were incorporated are inputted into a decoder 1004 from the equipment with which the image memory interface circuitry 1008 has memorized static-image data like a still picture disk.
[0162] The ON appearance KAINTA face circuit 1005 is a circuit for connecting this display and output units, such as an external computer, a computer network, or a printer. Not to mention performing I/O of image data, or an alphabetic character and graphic form information, it is also possible to perform a control signal, I/O of numeric data, etc. between CPUs1006 and the exteriors with which this image formation equipment is equipped depending on the case.
[0163] the image data, and an alphabetic character and graphic form information that the image generation circuit 1007 is inputted from the outside through said ON appearance KAINTA face circuit 1005 -- or it is a circuit for generating the image data for a display based on the image data, and the alphabetic character and graphic form information which are outputted from CPU1006. The circuit required for generation of an image is included in the interior of this circuit by making into the start the rewritable memory for accumulating image data, and an alphabetic character and graphic form information, the read-only memory the image pattern corresponding to a character code is remembered to be, the processor for performing an image processing, etc.
[0164] Although the image data for a display generated by this circuit is outputted to a decoder 1004, it is also possible to output to an external computer network and an external printer through said ON appearance KAINTA face circuit 1005 depending on the case.
[0165] CPU1006 mainly does the activity in connection with the motion control of this display, generation of a display image, selection, or edit.
[0166] For example, a control signal is outputted to a multiplexer 1003, and the picture signal displayed on a display panel is chosen suitably, or is combined. the picture signal displayed in that case -- responding -- the display-panel controller 1002 -- receiving -- a control signal -- generating -- a screen-display frequency, a scan method (for example, is it an interlace or non-interlaced?), and a stroke -- actuation of displays, such as the number of the scanning lines of a field, is controlled suitably. Moreover, the direct output of image data, or an alphabetic character and graphic form information is carried out, or an external computer and memory are accessed through said ON appearance KAINTA face circuit 1005 to said image generation circuit 1007, and image data, and an alphabetic character and graphic form information are inputted.
[0167] In addition, CPU1006 may be concerned also with the activity of the objects other than this. For

example, it may be directly concerned with the function which generates information or is processed like a personal computer or a word processor. Or as mentioned above, it may connect with an external computer network through the ON appearance KAINTA face circuit 1005, for example, the activity of numerical calculation etc. may be done in cooperation with an external instrument.

[0168] The input section 1014 is for a user to input an instruction, a program or data, etc. into said CPU1006, for example, can use various input devices, such as a keyboard, a joy stick besides a mouse, a bar code reader, and a voice recognition unit.

[0169] A decoder 1004 is a circuit for transforming inversely the various picture signals inputted from said 1007 thru/or 1013 to a three-primary-colors signal or a luminance signal and an I signal, and a Q signal. In addition, all over drawing, as a dotted line shows, as for a decoder 1004, it is desirable to equip the interior with an image memory. This is for treating a TV signal which faces transforming inversely by making MUSE into the start, and needs an image memory.

[0170] By having an image memory, the display of a still picture becomes easy. Or the advantage that the image processing and edit which make the start infanticide of an image, interpolation, amplification, cutback, and composition become easy in cooperation with said image generation circuit 1007 and CPU1006 is acquired.

[0171] A multiplexer 1003 chooses a display image suitably based on the control signal inputted from said CPU1006. Namely, a multiplexer 1003 chooses [from] a desired picture signal among the picture signals which are inputted from a decoder 1004 and which were transformed inversely, and outputs it to the actuation circuit 1001. In that case, it is also possible by switching and choosing a picture signal within 1 screen-display time amount to display the image which divides one screen into two or more fields, and changes with fields like the so-called multi-screen television.

[0172] The display-panel controller 1002 is a circuit for controlling actuation of the actuation circuit 1001 based on the control signal inputted from said CPU1006.

[0173] As a thing in connection with fundamental actuation of a display panel, the signal for controlling the operating sequence of the power source for actuation of a display panel (not shown) is outputted to the actuation circuit 1001. As a thing in connection with the actuation approach of a display panel, the signal for controlling for example, a screen-display frequency and a scan method (for example, is it an interlace or non-interlaced?) is outputted to the actuation circuit 1001. Moreover, depending on the case, the control signal in connection with adjustment of the brightness and contrast of a display image, a color tone, or the image quality of sharpness may be outputted to the actuation circuit 1001.

[0174] The actuation circuit 1001 is a circuit for generating the driving signal impressed to a display panel 201, and operates based on the picture signal inputted from said multiplexer 1003, and the control signal inputted from said display-panel controller 1002.

[0175] As mentioned above, although the function of each part was explained, it is possible to display the image information inputted from the various sources of image information in this image formation equipment by the configuration illustrated to drawing 17 on a display panel 201. That is, after ******** of various kinds of picture signals which make television broadcasting the start is carried out at a decoder 1004, they are suitably chosen in a multiplexer 1003 and are inputted into the actuation circuit 1001. On the other hand, a display controller 1002 generates the control signal for controlling actuation of the actuation circuit 1001 according to the picture signal to display. The actuation circuit 1001 impresses a driving signal to a display panel 201 based on the above-mentioned picture signal and a control signal. Thereby, an image is displayed in a display panel 201. These the actuation of a series of is controlled by CPU1006 in generalization.

[0176] In this image-formation equipment, it is possible also in carrying out the image edit which carries out as the start in the image processing which it not only displays the image memory built in said decoder 1004, and the thing chosen from the image generation circuit 1007 and information, but makes the start amplification, a cutback, a revolution, migration, edge enhancement, infanticide, interpolation, color conversion, aspect ratio conversion of an image, etc. as opposed to the image information to display, composition, elimination, connection, exchange, insertion, etc. Moreover, although especially explanation of this example did not describe, the specialized circuit for performing processing and edit

also about speech information may be prepared like the above-mentioned image processing or image edit.

[0177] Therefore, this image formation equipment can have functions, such as an image edit device treating the display device of television broadcasting, the terminal equipment of a television conference, a static image, and a dynamic image, a terminal equipment of a computer, a terminal equipment for clerical work that makes a word processor the start, and a game machine, by one set, and its application range is very wide as industrial use or a noncommercial use.

[0178] Based on the technical thought of this invention, various deformation is possible for the display shown in drawing 17 . For example, even if it excludes the circuit in connection with the function which does not have the purpose-of-use top need among the components of drawing 17 R> 7, it does not interfere. Moreover, with this, if based on reverse in activity eye, a component may be added further. For example, when applying this indicating equipment as a TV phone machine, it is suitable to add the transceiver circuit containing a television camera, a voice microphone, a lighting machine, and a modem etc. to a component.

[0179] In this indicating equipment, since thin-shape-izing of the display panel which especially makes an electron emission component the source of an electron beam is easy, depth of an indicating equipment can be made small. In addition to it, large-area-izing is easy, and since brightness is highly excellent also in an angle-of-visibility property, it is possible to display the image which was rich in presence overflow force with sufficient visibility. Moreover, as compared with the conventional indicating equipment, very uniform and bright high-definition color flat television was realized by having used the electron source equipped with the electron emission component of a large number which have a uniform property.

[0180]

[Effect of the Invention] As explained above, according to this invention, it becomes possible to form the detailed conductive film and a component electrode pattern by low cost over a large area.

[0181] Moreover, array formation of many electron emission components is carried out, and it can produce with the sufficient yield stably in the electron source which emits an electron according to an input signal.

[0182] Furthermore, in the image formation equipment using this electron source, bright high-definition image formation equipment, for example, color flat television, is realized by low current.

[Translation done.]